Serial No. 10/520,237
Atty. Doc. No. 2002P02127WOUS01

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JUL 20 2006

REMARKS

Claims 12-18 and 20-30 are pending in the application.

Claim 22 has been identified by the Examiner as being a duplicate of claim 21. Claim 21 has been canceled and claim 22 has been amended to more clearly define the subject matter applicants regard as the invention.

Claims 12 and 27 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter applicant regards as the invention. Claims 12 and 27 have been amended to overcome these rejections in view of the Examiner's remarks.

Claims 12-18 and 20-30 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kojima et al. (U.S. Pat. No. 5,507,623). Applicants respectfully traverse this rejection for the following reasons.

In general, Kojima et al. teaches an approach for optimizing a balance of anticorrosive and durability properties across a coating's thickness that is deposited on a gas turbine stationary or rotating blade. In this respect, column 3, lines 42-65 describe the relationship between anticorrosive properties and durability properties across a coating. More particularly, increasing the Al content realizes an increase in the anticorrosive properties of the upper layer of the coating; however, the toughness or durability of this layer is consequently reduced. This results in cracks forming in the upper layer of the coating, which ultimately allows for high temperature corrosion to infiltrate the cracks to a lower layer of the coating. Thus, in a coating where the surface portion of the Al content is increased for enhanced anticorrosive properties, the anticorrosive properties of a lower alloy-coated layer having an incremented Al content is also an important factor (col. 3, lines 61-65) due to crack formation in the upper layer of the coating.

Kojima et al. teaches two layer alloy coatings formed as an MCrAlX coating where M is selected from Fe, Ni and Co and X is Yttrium or other rare earth metals. The lower layer of the coating deposited on the surface of the substrate includes Co or Co-Ni as M, and a relatively lower content of Al to attain desirable anticorrosive properties. The upper layer of Kojima et al., which is deposited on the lower layer, contains Ni as M, and an increased content of Al relative

to the lower layer to attain desirable durability and anticorrosive properties near the surface of the coating. There is no Co or Co-Ni in the upper layer because the presence of Co or Co-Ni does not allow for the upper layer to have the desired anticorrosive properties. This is because increasing the Al content in the presence of Co or Co-Ni is problematic with respect to improving the anticorrosive properties (col. 3, lines 46-49).

Further in this respect, Kojima et al. teaches that Co or Co-Ni should not be contained in the upper layer because of the difficulty in attaining the desired anticorrosive properties in the presence of Co or Co-Ni. This clearly teaches away from the present invention as delineated in amended claims 12 and 27 because in both instances the outer layer of the claimed invention contains a quantity of Co, particularly in the range of between 5%-80wt%. Kojima et al. teaches that no Co may be contained in the upper layer whereas the present invention includes a quantity of Co in the outer layer to attain the desired performance characteristics of the coating.

Notwithstanding the above, the Examiner cites examples 22-24 of Table 1 in support of Kojima et al. teaching that the outer layer of Kojima et al. is an alloy of NiCoCrAlY wherein the Co content is between 20-30 wt%, Cr content is between 18-21wt% and Y content is 0.5wt%. The presence of Co in these examples contradicts the written disclosure, which repeatedly emphasizes that the upper layer needs to be devoid of Co in order to attain the desired anticorrosive properties in the upper layer of the finished coating. Furthermore, it is clearly disclosed in Kojima et al. that a test specimen was formed with MCrAlX alloy-coated layers having various compounds, including those of examples 22-24 and others in Table 1 (col. 10, lines 22-37), as <u>comparative</u> material, i.e., coatings to be compare to embodiments of the invention. This comparative material specifically includes an upper coated layer of NiCrAlY and CoCrAlY and a single-composition MCrAlY alloy-coated layer (col. 10, lines 24-27). The fact that the upper layers containing a quantity of Co are for comparative purposes requires further review of their respective performances, which may be garnered from Tables 2 and 3.

Tables 2 and 3 illustrate weight loss after high-temperature heating and damage to the base material and coated layer, respectively. Review of these Tables in conjunction with Table 1 reveals that any upper coated layer containing a quantity of Co, examples 13 and 16-27, results in either partial or entire damage to the coated layer at test temperatures of 900°C and 1000°C.

These test results substantiate that Kojima et al. teaches away from including Co in the upper layer of a coating if the coating is to have effective anticorrosive and durability properties.

With respect to the Al content in the outer layer as defined in amended claims 12 and 27, the Examiner cites column 4, lines 51-54 and Table 1, examples 9 and 10 in support of the rejection of these claims under 35 U.S.C. §103(a). Applicants respectfully submit that these cited sections do not teach or suggest the invention as claimed in amended claims 12 and 27. Column 4, lines 51-54 teach an Al content of 5-15 wt% in the upper alloy-coated layer, which only marginally overlaps the range of 3-6.5 wt% as claimed in amended claims 12 and 27. Such a marginal overlap at the low end of the cited range and the high end of the claimed range would not provide sufficient motivation for one skilled in the art to pursue other combinations down to and including the low end of the claimed range of 3 wt%.

This deficiency in motivation is not repaired by the examples 9 and 10 of Table 1, which disclose Al content of 5wt% and 4wt%, respectively. These examples are for comparative purposes and result in a maximum Al concentration (wt%) of Al in a diffused layer that appears to be zero or negligible as shown in Table 1. Obtaining a minimum concentration of Al in a diffused layer is a primary object of the teachings of Kojima et al. Thus, examples 9 and 10 provide no teaching, suggestion or motivation to one skilled in the art to use the range of Al content in an outer layer as claimed in amended claims 12 and 27.

Further, applicants respectfully disagree with the Examiner's position that Kojima et al. teaches that the γ-phase is large and the β-phase is intended to be reduced as much as possible, the Examiner citing column 3, lines 28-40 in support of this position. In the cited section, Kojima et al. teaches that in a Ni-Cr-Al system, "the solid solution limit of the β-phase (NiAl) in a γ-phase (Ni) which becomes the matrix is large". Applicants respectfully submit that it is the solid solution limit of the β-phase (NiAl) particles that is large not the γ-phase. The cited section goes on to disclose that it is hard to reduce the β-phase with incremental additions of Al. In addition, in an MCrAlX alloy-coated layer where M is Co or Co-Ni, a good deal of β-phase is reduced by augmenting the Al content of the surface portion. On the other hand, in an MCrAlX alloy-coated layer where M is Ni, it is difficult to reduce the β-phase even by augmenting the Al content of the surface portion.

Applicant's respectfully submit that neither the disclosure in column 3, lines 28-40 nor disclosure elsewhere in Kojima et al. teach or suggest the desirability of a pure γ-phase (Ni) as claimed in amended claims 12 and 27. One skilled in the art would not be motivated by the teachings of Kojima et al. or by the knowledge generally available to one skilled in the art to arrive at the invention as claimed in amended claims 12 and 27.

Notwithstanding the above remarks, claim 12 has been amended to more clearly define the subject matter which applicant regards as the invention. More specifically, claim 12 has been amended to recite that a layer of metastable aluminium oxide is formed on top of the outer layer. Support for this amendment is found in paragraph [0053] of the instant application.

With respect to claims 16 and 24, applicants respectfully submit that a critical aspect of the invention defined therein is that the outer layer be thinner than the intermediate layer to permit Al from the intermediate layer to diffuse through the outer layer to support the formation of aluminium oxide on the outer layer during long term service. The outer layer does not have a sufficient concentration of Al to support formation of aluminium oxide and is consequently dependent on diffusion of Al from the intermediate layer. Thus, applicants respectfully submit that this is a critical aspect of the invention and that there is no teaching, suggestion or motivation disclosed within Kojima et al. for one skilled in the art to arrive at the varying thickness of layers as defined in claims 16 and 24.

Claim 21 has been cancelled.

Claims 1-11 and 19 have been previously cancelled.

In view of the above remarks and amendments to the claims, applicants respectfully submit that Kojima et al. does not teach, suggest or provide the requisite motivation to one skilled in the art to arrive at the invention as claimed in amended claims 12 and 27, and all claims depending there from. In view of the above remarks and amendments to this application applicant respectfully requests reconsideration of this application and allowance of claims 12-18, 20 and 22-30.

Conclusion

The commissioner is hereby authorized to charge any appropriate fees due in connection with this paper, including the fees specified in 37 C.F.R. §§ 1.16 (c), 1.17(a)(1) and 1.20(d), or credit any overpayments to Deposit Account No. 19-2179.

Respectfully submitted,

Dated: 7/20/06

By: [signature]

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